The Internet PC

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Almost everyone agrees that the potential of the Internet to improve personal computing is inspiring. What is hotly disputed is exactly how using a PC or browsing the Internet will change. Microsoft's aim is to make Internet technology central to the PC experience, but other companies riding the Internet tidal wave have their own strategies and visions

Some companies promoting server hardware more expensive than PCs suggest that the Internet will finally do for them what they've dreamed of all along—that it will kill the movement toward powerful personal machines, and recentralize computing. They believe that a vaguely defined "Internet terminal," connected to an expensive central server, will supplant the PC.

Anyone reading this online knows that the Internet is changing the way people get information and interact. The Internet gives anybody with a computer and a modem the opportunity to reach a global audience.

As exciting for me is the tremendous potential of the Internet to reduce the cost and complexity of using a PC or a network of PCs.

There are promising hints already. You can click your mouse to update or configure software, including the web browser itself. You can browse or search for answers to technical questions. Soon you'll even be able to use the Internet to show your screen to remote support personnel, so that they'll be able to see your problem for themselves. These innovations are just the beginning.

Inexpensive PCs are coming. It's axiomatic that you're always able to buy more personal computer for your money than you could a year earlier. But prices have not fallen as fast as they might have, because surprising growth in PC sales volumes has kept components in relatively short supply.

With growth rates moderating now and components becoming plentiful, in the not-too-distant future you'll almost certainly see capable PCs priced well below $1,000.

Simple PCs are coming, too. I recently announced an initiative, supported by many leading hardware manufacturers, to create what we call the "Simply Interactive Personal Computer"—or SIPC. It is a framework of technologies that will make the PC platform the center of entertainment, communications and productivity in both home and office

A SIPC system will be quite easy to use. It will turn on instantly, like most other consumer appliances. It will interconnect with VCRs, stereos, and TVs. And every SIPC will run thousands of Windows applications, including web browsers and software for faxing, voice messaging, conferencing, and exchanging e-mail.

The Latest Killer App
Our industry is always looking for the next "killer application"—for a category of software that, by its utility and intelligent design, becomes indispensable to millions of people. Word processors and spreadsheets were the killer applications for business PCs starting in 1981.

The latest confirmed "killer app" is the web browser, the kind of software you're probably using right now to read these words. A browser lets you move from page to page on the Internet's World Wide Web, or to

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336

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navigate the private "Intranets" that corporations are establishing to improve internal information-sharing.

Today the most popular browsers are Netscape Navigator, which got an early following because it lead the way with speed and features and used to be free, and Microsoft Internet Explorer, an offering that will be free forever on both the Windows and Macintosh platforms.

Netscape and Microsoft have overlapping visions of the future of the Internet. Each company is working as hard as it can, as fast as it can, to develop software that supports its approach.

One consequence of this feature race is that browsers are evolving from relatively simple pieces of software into large programs, enhanced with various extensions, that engage every element of a personal computer. Browsers must be large, to support web pages that use active controls, Java programming, Shockwave animations, Acrobat files, compressed graphics, video, rich fonts and the like. Future web pages will make more use of audio, and future browsers will let people add annotations to a page or explore such things as the history of changes to a site.

Even without the new wonders coming up, contemporary browsers have already reached the point where they're more demanding of a computer's resources than any other applications—even high-end word processors and spreadsheets.

"I don't know that it's bad to be big," Marc Andreessen, a cofounder of Netscape, said in a recent interview about his company's browser software. "If you're adding functionality that people want, you pretty much have to [create a large browser]."

Netscape's strategy is to make Windows and the Apple Macintosh operating system all but irrelevant by building the browser into a full-featured operating system with information browsing. Over time Netscape will add memory management, file systems, security, scheduling, graphics and everything else in Windows that applications require.

The company hopes that its browser will become a de facto platform for software development, ultimately replacing Windows as the mainstream set of software standards. In Netscape's plan, people will get rid of their existing PC and Mac applications in favor of new software that will evolve around the Netscape browser.

Under ordinary circumstances, it would seem unattractive to build an incompatible operating system on top of an existing operating system. But because the widespread adoption of the Internet is a sea-change, Netscape's strategy could conceivably work if Microsoft wasn't bringing fast-paced innovation to Windows.

But at Microsoft, we're not standing still. On the contrary, the Internet opportunity and the competition have us as charged up as we've ever been.

Windows to the Future

Microsoft's approach is to make Windows so Internet-friendly that no one using it will want a separate browser—not even a free browser. In Microsoft's view, people will use Windows to browse the web, just as they already use it to "browse" servers on corporate networks or files on local disks.

It makes little sense to have two separate worlds, one for PC applications running Windows and the other for Internet applications written for a browser operating system. Our goal is to meld the best of the PC with the best of the web, creating a single world of great promise.

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Windows 95 already allows a folder to contain links to files and other folders. These links are called shortcuts. In an add-on product to be released later this year, we'll enhance Windows so that any folder can be a web page—complete with descriptive text and graphics, as well as the links to files and folders.

Here's a simple example of how this is already working in pre-release versions of the add-in product: A folder can be displayed conventionally, as a list of file names or as a collection of icons. Double-clicking on a name or icon takes you to the item, as you would expect. But switch to web view, and the files are represented as links on a full-fledged web page—complete with graphics and descriptive text that makes it clear what role each link plays. In web view, a single click takes you to an item.

Microsoft believes that local and remote data should be treated identically. We expect browsing to be the dominant metaphor for using a computer.

Microsoft will embrace and extend standards and technologies coming out of the Internet, and provide great implementations for the PC and Macintosh. The moniker we've given our cross-platform technologies is ActiveX™—a name that reflects our belief that the days of static, lifeless web pages are numbered. We expect to see popular web pages enhanced with video, sound, and programming. In short, we expect pages to come alive.

An important benefit of Microsoft's strategy is that it preserves the tremendous investments that people and companies have made in computer hardware, software, and training. The world has more than 150 million users of Windows, and there are 5 million people developing Windows software, most of them with Microsoft Visual Basic. More than 1,000 companies supply component software that will adapt in pretty straightforward fashion into ActiveX features. Microsoft's Internet strategy rewards rather than discards the investments these people and companies have made.

Netscape shares Microsoft's view that users will get the most from the Internet by using capable personal computers that can store and process information locally as well as connect to powerful servers. But not every company shares this enthusiasm for personal computing.

A Terminal Idea

Sun Microsystems and Oracle are the two most vocal proponents of replacing PCs with special-purpose terminals that draw information from centralized servers.

These companies, which sell servers and server software, contend that the combination of powerful database servers, downloadable component software, and fast communications links will make it unnecessary for wazzu people to have real personal computers connected to the Internet. They extol the virtue of networked terminals that are, by design, incompatible with today's PCs and applications.

These so-called "Internet-terminals" or "network computers" haven't come to market yet, and specifics about them are scarce. The price tag is said to be about $500, for a terminal that lacks certain elements of a real PC, such as disk or CD-ROM drives.

It's easy to paint a rosy picture when details aren't in focus.

To bring the Internet terminal into focus, we must ask what tradeoffs it embodies: What else, in addition to disk drives and compatibility with mainstream software, is being left out in order to make the machine a few hundred dollars less expensive than a PC?

Until terminals actually hit the market, we really won't know. We can, however, speculate.

Presumably the terminal's browser software will be stored in read-only memory (ROM), since there won't be a disk drive. This is a serious tradeoff, because ROM-based software cannot be updated. It all but

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guarantees a terminal's early obsolescence, because browser software is evolving rapidly.

Users of software applications have never been satisfied for long with static features or functionality. The consumer's appetite for constantly improving performance is what has made the PC industry so vibrant and innovative—and what makes it so hard for computer companies to find buyers for last year's models, even at great prices.

There is a precedent for weighing terminals against PCs. Sun and Oracle used to promote diskless "dumb terminals" for corporate local-area networks. You can make a case for the practicality of terminals that are connected to broadband networks. That's because local drives are less important when large amounts of data can be downloaded rapidly. As it happened, though, the so-called "X-terminal" didn't end up much cheaper than a PC, and never achieved even 1 percent market share.

Sun, Oracle, and a variety other companies have higher hopes for Internet terminals. One of their main arguments is that the networked nature of the terminals will simplify tasks such as upgrading software. But these ease-of-use advantages can accrue to any connected computer. People and companies alike will reap these benefits from the Internet—but not because their computers no longer have adequate memory or can't run all of today's applications.

Without a doubt, some people will buy Internet terminals. The machines may find a place in the corporate marketplace, where Intranets are becoming vital and broadband networks are fairly common. The terminals would have better prospects, though, if they were compatible with mainstream corporate software.

Terminals will find less acceptance in homes, where narrowband and midband connections to the Internet will be the rule for several years. Midband connections, provided via the likes of ISDN and cable modems, will be fast enough to please people who use PCs but not necessarily people who use terminals. The rich content and applications that will be popular in homes won't be well suited to weak computers (terminals) tied to weak networks.

From a price standpoint, terminals will be squeezed in the home marketplace between PCs getting cheaper on the high end, and people hooking TVs up to the Internet at the low end. The Internet terminal is too close to being a PC, without really being one. It loses the advantage of being a general-purpose computer able to run off-the-shelf software, yet offers little in return other than a somewhat lower price-tag.

The tradeoffs may be more attractive for several other potential devices that you'll connect to the Internet. These are machines you'll use in addition to, rather than instead of, a PC.

For example, a telephone handset connected to the Internet involves major compromise. You give up everything except voice communications. But because a handset will be dramatically cheaper and more portable than a PC, the tradeoffs make sense.

New-generation set-top boxes will allow television sets to retrieve content from the web, but there will be ample compromise. Usually there won't be keyboards, although remote controls can function as mice. And televisions screens don't display text well. Furthermore, nobody publishes information on the Internet for display on TV screens yet, although that will change.

Overall, however, the tradeoffs for the set-top box look pretty good, especially considering that TVs hooked to the Internet could allow people from every economic sphere to enjoy the Internet's benefits. Keep in mind, though, that communications charges will mount up in the long run.

Game machines and consumer-electronics devices, such as some of the forthcoming Digital Video Disk (DVD) Players, will connect to the Internet, using a slender cousin of Windows as the operating system.

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We'll see an explosion of interest in multi-player games, where the contestants meet only in cyberspace.

Hardware companies will begin selling handheld personal digital assistants (PDAs) that rely on another cousin of Windows. These miniature information appliances will have LCD screens and connect wirelessly to desktop machines and networks, including two-way pager networks. Because these networks will, in turn, tie into the Internet, you'll be able to use the PDAs to browse the web or exchange e-mail.

Over time, PDAs will evolve into what I like to call "wallet PCs"—all-in-one pocket-sized devices that will serve as personal communicators, maps, guide books, repositories of digital money and credit information, identification, tickets, and so forth.

It's clear that a number of information appliances are going to become common in homes as well as in our pockets, and that these devices can't all be expensive. Keeping costs down is a priority, but people won't settle for underpowered tools.

The Internet era is a challenge and an opportunity for every person and for most companies. It certainly is for Microsoft. We've had a lot of challenges in the past 20 years, but this one happens to be great fun. We're optimistic about the outcome because we can see how combining the best of Windows and the Internet will make personal computing easier and better—all without asking people and companies to throw away their existing investments.

I'm betting on the PC, as I always have. I'm betting on Windows, too. I think most people will, and for good reason.

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